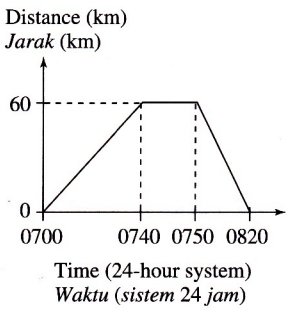
GERAK GEMPUR 7

# Graphs of Motion
## *Graf Gerakan*

**PAPER 1**

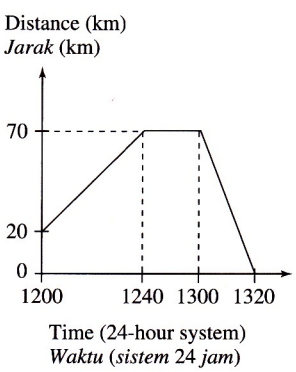
**1.** The distance-time graph shows the journey by a car.
*Graf jarak-masa di bawah menunjukkan perjalanan sebuah kereta.*




Calculate the average speed, in km $h^{-1}$, of the car for the whole journey.
*Hitung laju purata, dalam* km $j^{-1}$, *kereta itu bagi seluruh perjalanan.*

**A** 40
**B** 45
**C** 80
**D** 90

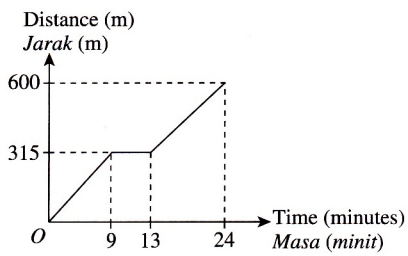
**2.** The distance-time graph of the journey by a motorcycle from town *A* to town *B* and then to town *C* after a rest of 20 minutes at town *B*.
*Graf jarak-masa di bawah menunjukkan perjalanan sebuah motosikal dari bandar A ke bandar B dan kemudian ke bandar C selepas berehat selama* 20 *minit di bandar B.*




Calculate the total distance, in km, travelled by the motorcycle.
*Hitung jumlah jarak, dalam* km, *yang dilalui oleh motosikal itu.*

**A** 80 **B** 100
**C** 120 **D** 140

**3.** The distance-time graph shows the motion of Anna from her house to a post office.
*Graf jarak-masa di bawah menunjukkan gerakan Anna dari rumahnya ke sebuah pejabat pos.*




Which of the following is **not** true about Anna's journey?
*Antara berikut, yang manakah* **tidak** *benar tentang perjalanan Anna?*

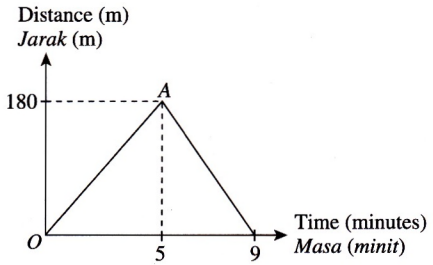
**A** The distance between her house and the post office is 600 m.
*Jarak di antara rumahnya dan pejabat pos itu ialah* 600 m.

**B** Anna travelled at a speed of 35 m $min^{-1}$ in the first 9 minutes.
*Anna bergerak dengan laju* 35 m $min^{-1}$ *dalam* 9 *minit pertama.*

**C** Anna stopped for 4 minutes during her journey.
*Anna berhenti selama* 4 *minit dalam perjalanannya.*

**D** Her average speed in the period of 24 minutes is 50 m $min^{-1}$.
*Laju puratanya dalam tempoh* 24 *minit itu ialah* 50 m $min^{-1}$.

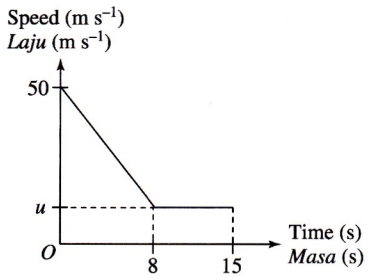
**4.** The distance-time graph shows the motion of a particle from a point $O$ to a point $A$ which is 180 m away and back to the point $O$ again in the period of $T$ seconds.
*Graf jarak-masa di bawah menunjukkan gerakan suatu zarah dari titik O ke titik A yang sejauh* 180 m *dan kembali semula ke titik O dalam tempoh T saat.*




Calculate the average speed, in m $s^{-1}$, of the particle for the whole journey.
*Hitung laju purata, dalam* m $s^{-1}$, *zarah itu bagi seluruh perjalanan.*

**A** 10
**B** 20
**C** 30
**D** 40

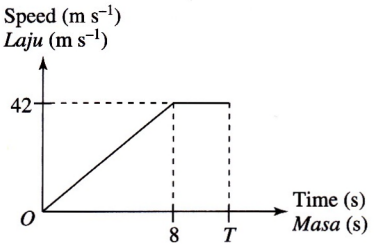
**5.** The speed-time graph of the motion of a particle for a period of 15 seconds.
*Graf laju-masa di bawah menunjukkan gerakan suatu zarah untuk tempoh* 15 *saat.*




The acceleration of the particle in the first 8 seconds is –5 m $s^{-2}$. Calculate the value of $u$.
*Pecutan zarah itu dalam* 8 *saat pertama ialah* –5 m $s^{-2}$. *Hitung nilai u.*

**A** 8
**B** 10
**C** 12
**D** 16

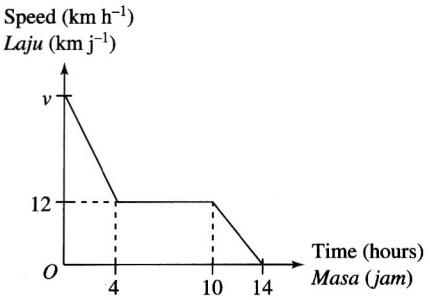
**6.** The speed-time graph show the motion of a motorcycle for a period of $T$ seconds.
*Graf laju-masa di bawah menunjukkan gerakan sebuah motosikal untuk tempoh T saat.*




The total distance travelled by the motorcycle is 336 m. Calculate the value of $T$.
*Jumlah jarak yang dilalui oleh motosikal itu ialah* 336 m. *Hitung nilai T.*

**A** 4
**B** 9
**C** 12
**D** 14

**7.** The speed-time graph shows the journey of a cyclist for a period of 14 hours.
*Graf laju-masa di bawah menunjukkan perjalanan seorang penunggang basikal untuk tempoh* 14 *jam.*




The average speed of the cyclist for the period of 14 hours is 13 km $h^{-1}$. Calculate the value of $v$.
*Laju purata penunggang basikal itu untuk tempoh* 14 *jam ialah* 13 km $j^{-1}$. *Hitung nilai v.*

**A** 15
**B** 17
**C** 19
**D** 31

## PAPER 2

### Section A

**1.** Mr Lee drove his car for a distance of 270 km from Ipoh to Seremban in 3 hours. The distance, $s$ km, that Mr Lee travelled in $t$ hours is given by the equation $s = 90t$.
*Encik Lee memandu kereta sejauh* 270 km *dari Ipoh ke Seremban dalam* 3 *jam. Jarak,* $s$ km, *yang dilalui oleh Encik Lee dalam* $t$ *jam diberi oleh persamaan* $s = 90t$.

(a) Complete the distance-time table in the answer space using the equation $s = 90t$.
*Lengkapkan jadual jarak-masa di ruang jawapan menggunakan persamaan* $s = 90t$.

(b) Hence, complete the distance-time graph in the answer space to represent Mr Lee's journey from Ipoh to Seremban.
*Seterusnya, lengkapkan graf jarak-masa di ruang jawapan untuk mewakili perjalanan Encik Lee dari Ipoh ke Seremban.*

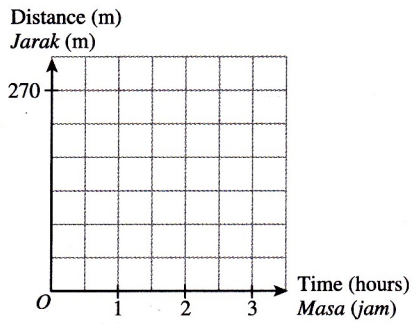
[4 marks/4 *markah*]

Answer/*Jawapan*:

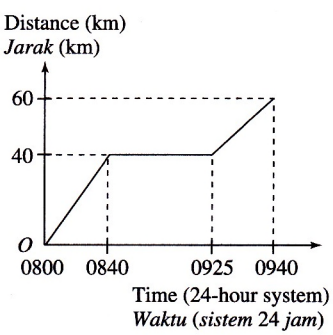
(a)

| **Time, $t$ (hours)** *Masa, $t$ (jam)* | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| **Distance, $s$ (km)** *Jarak, $s$ (km)* | 0 | | | 270 |

(b)




**2.** The distance-time graph shows the motion of a lorry from a factory to a port.
*Graf jarak-masa di bawah menunjukkan gerakan sebuah lori dari sebuah kilang ke sebuah pelabuhan.*




(a) Calculate the speed, in km $h^{-1}$, of the lorry in the last 15 minutes.
*Hitung laju, dalam* km $j^{-1}$, *lori itu dalam* 15 *minit terakhir.*

(b) Describe the motion of the lorry for the whole journey.
*Huraikan gerakan lori itu bagi seluruh perjalanan.*

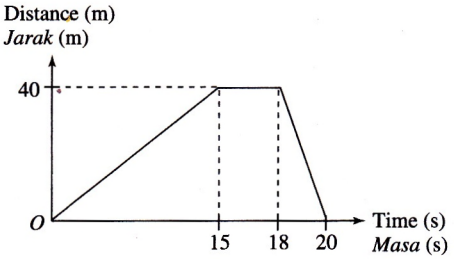
[4 marks/4 *markah*]

Answer/*Jawapan*:

(a)

(b)

**3.** The distance-time graph shows the motion of a particle for a period of 20 seconds.
*Graf jarak-masa di bawah menunjukkan gerakan suatu zarah untuk tempoh* 20 *saat.*




(a) State the total distance, in m, travelled by the particle.
*Nyatakan jumlah jarak, dalam* m, *yang dilalui oleh zarah itu.*

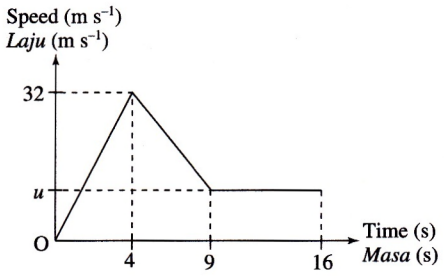
(b) What is the duration, in seconds, when the particle is stationary?
*Berapakah tempoh, dalam saat, ketika zarah itu berhenti?*

(c) Calculate the average speed, in m $s^{-1}$, of the particle for the whole journey.
*Hitung laju purata, dalam* m $s^{-1}$, *zarah itu bagi seluruh perjalanan itu.*

[4 marks/4 *markah*]

Answer/*Jawapan*:
(a) (b) (c)

**4.** The speed-time graph shows the motion of a particle for a period of 16 seconds.
*Graf laju-masa di bawah menunjukkan gerakan suatu zarah untuk tempoh* 16 *saat.*




(a) Calculate the rate of change of speed, in m $s^{-2}$, of the particle in the first 4 seconds.
*Hitung kadar perubahan laju, dalam* m $s^{-2}$, *zarah itu dalam* 4 *saat pertama.*

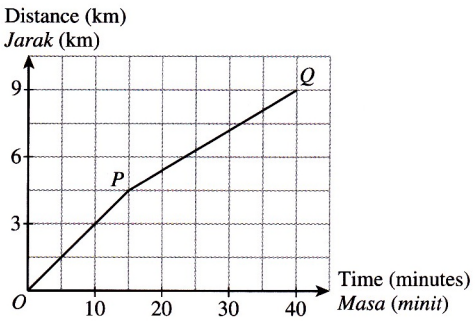
(b) Calculate the value of $u$, if the average speed of the particle in the last 12 seconds is 13 m $s^{-1}$.
*Hitung nilai u, jika laju purata zarah itu dalam tempoh* 12 *saat terakhir ialah* 13 m $s^{-1}$.

[4 marks/4 *markah*]

Answer/*Jawapan*:
(a) (b)

**Section B**

**5.** (a) The distance-time graph shows the motion of Eddie cycling from his house to a stadium passing through a mosque. Graph *OP* represents the journey from his house to the mosque and graph *PQ* represents the journey from the mosque to the stadium.
*Graf jarak-masa di bawah menunjukkan gerakan Eddie berbasikal dari rumahnya ke sebuah stadium melalui sebuah masjid. Graf OP mewakili perjalanan dari rumahnya ke masjid itu dan graf PQ mewakili perjalanan dari masjid ke stadium.*



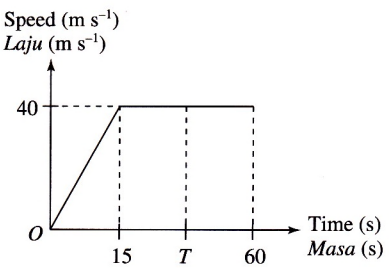

(i) Calculate the speed, in km $h^{-1}$, of Eddie from his house to the mosque.
*Hitung laju, dalam* km $j^{-1}$, *Eddie dari rumahnya ke masjid itu.*

(ii) Calculate the average speed, in km $h^{-1}$, of Eddie for his whole journey.
*Hitung laju purata, dalam* km $j^{-1}$, *Eddie bagi seluruh perjalanan.*

[4 marks/4 *markah*]

Answer/*Jawapan*:

(b) The speed-time graph shows the motion of a lorry for a period of 60 seconds.
*Graf laju-masa di bawah menunjukkan gerakan sebuah lori untuk tempoh* 60 *saat.*




(i) Calculate the rate of change of speed, in m $s^{-2}$, in the first 15 seconds.
*Hitung kadar perubahan laju, dalam* m $s^{-2}$, *dalam* 15 *saat pertama.*

(ii) HOTS Calculate the value of *T*, if ratio of the distance travelled in the first *T* seconds to the total distance travelled in 60 seconds is 2 : 3.
*Hitung nilai T, jika nisbah jarak yang dilalui dalam T saat pertama kepada jumlah jarak yang dilalui dalam* 60 *saat ialah* 2 : 3.

[5 marks/5 *markah*]

Answer/*Jawapan*:

**6.** (a) The speed-time table shows the motion of a particle for a period of 40 seconds.
*Jadual laju-masa di bawah menunjukkan gerakan suatu zarah untuk tempoh* 40 *saat.*

| **Time (seconds)** ***Masa (saat)*** | 0 | 10 | 20 | 30 | 40 |
|---|---|---|---|---|---|
| **Speed (m $s^{-1}$)** ***Laju* (m $s^{-1}$)** | 0 | 15 | 30 | 45 | 60 |

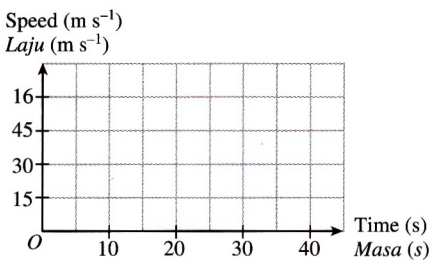
(i) Draw a speed-time graph in the answer space to represent the motion of the particle.
*Lukis graf laju-masa di ruang jawapan untuk mewakili gerakan zarah itu.*

(ii) Calculate the total distance, in m, travelled by the particle.
*Hitung jumlah jarak, dalam* m, *yang dilalui oleh zarah itu.*

[4 marks/4 *markah*]

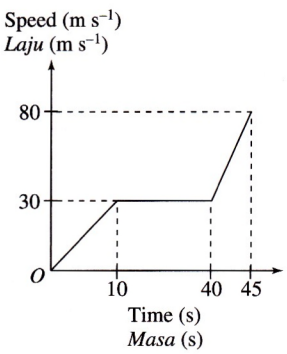
Answer/*Jawapan*:

(i)




(ii)

(b) The speed-time graph shows the motion of a vehicle for a period of 45 seconds.
*Graf laju-masa di bawah menunjukkan gerakan sebuah kenderaan untuk tempoh masa* 45 *saat.*




(i) State the length of time, in seconds, when the vehicle travels at a uniform speed.
*Nyatakan tempoh masa, dalam saat, ketika kenderaan itu bergerak dengan laju seragam.*

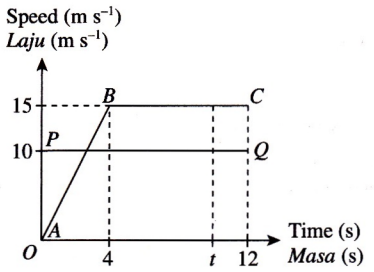
(ii) Calculate the rate of change of speed, in m $s^{-2}$, of the vehicle in the last 5 seconds.
*Hitung kadar perubahan laju, dalam* m $s^{-2}$, *kenderaan itu dalam* 5 *saat terakhir.*

(iii) Calculate the total distance, in m, travelled in the first 40 seconds.
*Hitung jumlah jarak, dalam* m, *yang dilalui dalam* 40 *saat pertama.*

[5 marks/5 *markah*]

Answer/*Jawapan*:

**7.** (a) The speed-time graph shows the motion of two particles, $X$ and $Y$, for a period of 12 seconds. Graph $ABC$ represents the motion of particle $X$ and graph $PQ$ represents the motion of particle $Y$.
*Graf laju-masa di bawah menunjukkan gerakan dua zarah, X dan Y, untuk tempoh* 12 *saat. Graf ABC mewakili gerakan zarah X dan graf PQ mewakili gerakan zarah Y.*




(i) Calculate the distance, in m, travelled by particle $X$ in the first 4 seconds.
*Hitung jarak, dalam m, yang dilalui oleh zarah X dalam* 4 *saat pertama.*

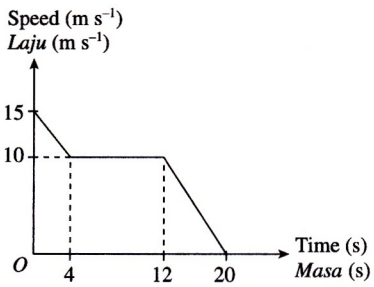
(ii) Calculate the average speed, in m $s^{-1}$, of particle $X$ for the period of 12 seconds.
*Hitung laju purata, dalam* m $s^{-1}$, *zarah X dalam tempoh* 12 *saat.*

(iii) Calculate the value of $t$, if the distance travelled by particle $X$ in $t$ seconds is equal to the distance travelled by particle $Y$ in the period of 12 seconds.
*Hitung nilai t, jika jarak yang dilalui oleh zarah X dalam t saat adalah sama dengan jarak yang dilalui oleh zarah Y dalam tempoh* 12 *saat.*

[5 marks/5 *markah*]

Answer/*Jawapan*:

(b) The speed-time graph shows the motion of a particle for a period of 20 seconds.
*Graf laju-masa di bawah menunjukkan gerakan suatu zarah untuk tempoh* 20 *saat.*



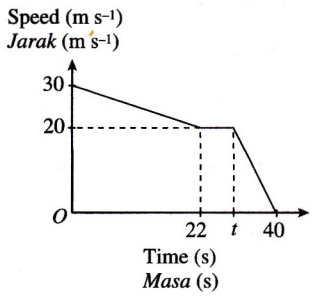

(i) Calculate the average speed, in m $s^{-1}$, of the particle for the period of 20 seconds.
*Hitung laju purata, dalam* m $s^{-1}$, *zarah itu untuk tempoh* 20 *saat.*

(ii) Describe the motion of the particle in the last 8 seconds.
*Huraikan gerakan zarah itu dalam* 8 *saat terakhir.*

[4 marks/4 *markah*]

Answer/*Jawapan*:

**8.** (a) The speed-time graph shows the motion of a particle for a period of 40 seconds.
*Graf laju-masa di bawah menunjukkan gerakan suatu zarah untuk tempoh* 40 *saat.*




The distance travelled by the particle at a uniform speed is 200 m.
*Jarak yang dilalui oleh zarah itu dengan laju seragam ialah* 200 m.

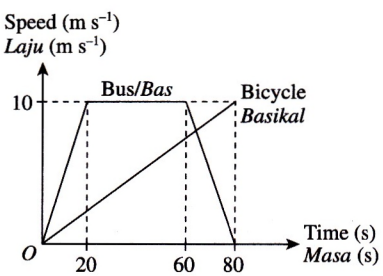
(i) Calculate the value of $t$.
*Hitung nilai t.*

(ii) Calculate the average speed, in m $s^{-1}$, of the particle for the period of 40 seconds.
*Hitung laju purata, dalam* m $s^{-1}$, *zarah itu untuk tempoh* 40 *saat.*

[4 marks/4 *markah*]

Answer/*Jawapan*:

(b) The speed-time graph shows the motion of a bus and a bicycle for a period of 80 seconds.
*Graf laju-masa di bawah menunjukkan gerakan sebuah bas dan sebuah basikal untuk tempoh* 80 *saat.*




(i) Calculate the rate of change of speed, in m $s^{-2}$, of the bus in the first 20 seconds.
*Hitung kadar perubahan laju, dalam* m $s^{-2}$, *bas itu dalam* 20 *saat pertama.*

(ii) Calculate the difference in distance, in m, travelled by the bus and the bicycle for the period of 80 seconds.
*Hitung beza jarak, dalam* m, *yang dilalui oleh bas dan basikal itu untuk tempoh* 80 *saat.*

[5 marks/5 *markah*]

Answer/*Jawapan*: